International Journal of Agricultural
Science and Research (IJASR)
ISSN (P): 2250-0057; ISSN (E): 2321-0087
Vol. 7, Issue 6, Dec 2017, 165-170




# GENETIC DIVERGENCE, HERITABILITY AND YIELD TRAITS OF DIFFERENT ASH GOURD ACCESSIONS (*BENINCASA HISPIDA*)

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***ABSTRACT***

***A study was undertaken to identify the best genotype for optimum yield under coastal ecosystem. During the experimental period, the various genetic divergence characters such as genetic variability and heritability, genetic advance, interrelationship between yield and yield attributing characters were investigated for selected 27 accessories of ash gourd. The study revealed that higher phenotypic co-efficient variation (PCV) and genotypic co-efficient variation (GCV) were recorded with respect to the characters for node number of first male flower, single fruit weight and yield per vine, whereas, moderate GCV and PCV were observed for node number of first female flower. The result further revealed that higher heritability values were observed in all 27 genotypes of ash gourd.***

***KEYWORDS: Ash Gourd Genetic Variability, Heritability & Genetic Advance***

**Received:** Sep 27, 2017; **Accepted:** Oct 14, 2017; **Published:** Nov 07, 2017; **Paper Id.:** IJASRDEC201722

Original Article

## INTRODUCTION

Ash gourd, *Benincasa hispida* belongs to the family cucurbitaceae. Annual vine native to Asian tropics. It is frost-sensitive, predominantly tendril-bearing vines, which are found in subtropical and tropical regions around the globe. The fruit is fairly rich in calcium, phosphorus, iron, thiamine, riboflavin, niacin and vitamin C. Petha juice, is highly recommended for maintaining general good health and curing many diseases. Fruit is used to treat summer fevers, insanity, epilepsy, urinary infection and biliousness. It possesses anti-ulcer activity and is used as a tonic for the heart. The rind is used to treat diabetes and the seeds to expel tape worms. The juice of the fruit is effective in cases of mercury poisoning and snake bites. It also used to increase weight after sudden weight loss, weakness of the heart and an anemia. Indo china in the centre of diversity and it is perhaps the most polymorphic crop screening of ash-gourd genotypes based on genotypic, phenotypic, yield and quality components will be very much useful for increasing production under the coastal ecosystem.

## MATERIALS AND METHODS

The experiment was carried out during 2010 – 2011. The experiment was carried out in the vegetable field unit of the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu. Twenty seven accessions of ash gourd from different agro-climatic regions of South India, which showed diverse fruit and other economic characters. The seeds of twenty seven accessories were sown during January 2010, at a spacing of 2 m between plants and 2 m between rows. Each row consisted of 10 plants in three replications. The design adopted was Randomized Block Design. Observations were recorded for yield and yield

related characters. One plant per pit from each replication was selected randomly and tagged and observations were recorded from these plants for different characters. The mean values of the data were used for statistical analysis.

## RESULTS AND DISCUSSIONS

The results of the investigation carried out using twenty seven genotypes of ash gourd of diversified origin to elicit information on the quantum of variability, heritability, genetic advance and genetic divergence The analysis of variance (Table 1, 2) for various characters gives a vivid picture for the existence of wide genetic variability among the genotypes chosen for the study as indicated by the significant differences at the genotypic level. With respect of different characters studied. Wide range of variation was observed for all characters.

Higher estimates of PCV and GCV was registered for the traits *viz.*, yield per vine (70.07 and 69.62%), single fruit weight (47.75 and 44.89%), node number of first male flower (43.42 and 42.45 % respectively) and seed weight (42.15 and 42.04%). Number of fruits per vine (37.48 and 27.72%), Number of female flowers per vine (32.12 and 26.54%) and flesh thickness (32.40 and 20.89%) expressed higher estimates of PCV and moderate estimates of GCV. Moderate estimates of PCV and GCV were observed for sex ratio (26.28 and 24.49%) and node number of first female flower (24.18 and 22.45%). Moderate estimates of PCV and lower estimates of GCV were observed for seed: pulp ratio (22.06 and 11.56%). Lowest estimates of PCV and GCV were observed for fruit girth (19.56 and 18.87%)**,** number of male flowers per vine (19.06 and 17.03%), fruit length (18.45 and 9.37%), vine length (16.10 and 9.25%), number of nodes per vine (10.26 and 7.50%), days to first male flowering (7.99 and 5.17%) and days to first female flowering (7.25 and 4.31%).

The GCV for different characters ranged from 4.31 percent for days to first female flowering to 69.62 percent for yield per vine. High GCV observed in the present study for yield per vine, single fruit weight, node number of first male flower and seed weight also confirm the presence of fixable variation among the genotypes which can be exploited. High amount of fixable variation in ash gourd has also been reported earlier by Singh *et al.,* (1996).

In pumpkin, high estimates for both PCV and GCV were obtained for yield and number of fruits per plant by Mohanty and Mishra (1999) and Mohanty (2001). High GCV was observed for yield per plant, number of seeds per fruit and single fruit weight by Sripriya (1999), when the PCV and GCV values of different traits were compared, it was found that the differences were narrow for number of nodes per vine, days to first male flowering, days to first female flowering, node number of first male flower, number of female flowers per vine, sex ratio, fruit girth, seed weight and yield per vine. This suggests that these characters may be less influenced by environment which is in agreement with the findings of Singh *et al.,* (2000) in ash gourd and Ahamed *et al.,* (2005) in bottle gourd. The other characters viz., vine length, number of female flowers per vine, number of fruits per vine, flesh thickness, fruit length and seed: pulp ratio showed wide difference in the values of PCV and GCV, thus indicating the possibility of higher environmental influence on expression of these characters.

In Heritability and genetic advance the high heritability values of more than 90 per cent were observed for yield per vine, node number of first male flower, fruit girth and seed weight which corroborated the findings of Mohanty (2001) in pumpkin and Dahiya *et al.,* (2001) in round melon. The other characters viz., node number of first female flower, sex ratio and single fruit weight recorded heritability values of 86.19, 86.86 and 88.36 per cent respectively. Heritability values of the range 70 – 80 per cent were obtained for number of male flowers per vine, while number of female flowers per vine recorded comparatively moderate heritability value of 68.26. Number of nodes per vi ne and number of fruits per vine

recorded heritability value of 53.42 and 54.70 respectively the traits such node number of first male flower, node number of first female flower, number of male flowers per vine, number of female flowers per vine, sex ratio, single fruit weight, fruit girth, seed weight and yield per vine recorded the highest heritability values combined with higher values of genetic advance as per cent of mean Singh *et al.*, (2002) observed high estimates of heritability in ash gourd. Similar findings were observed by Tarsem Lal and Sanjay Singh (1997), Sripriya (1999) and Mohanty (2001) in pumpkin, Sriramamurthy (2000) in cucumber and Samadia (2007) in round melon.

## CONCLUSIONS

The data in this study shows that, among the genotypes, BH-24 (Kanyakumari) had higher mean performance for yield and its components, followed by BH-10 (Aduthurai) and BH-6 (Panruti). Higher PCV and GCV was recorded for the characters viz., node number of first male flower, single fruit weight and yield per vine, while moderate GCV and PCV were observed for node number of first female flower and sex ratio. Higher heritability values of more than 90 per cent were observed for yield per vine, node number of first male flower, fruit girth and seed weight.

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**Table 1: The Growth Attributing Characters of Selected Ash Gourd Accessories during Experimental Period**

| Genotypes | Origin / Location | Vine Length (m) | No. of Nodes Per Vine | Days to First Male Flowering | Days to First Female Flowering | Node Number of First Male Flower | Node Number of First Female Flower | No. Of Male Flowers Per Vine | No. of Female Flowers Per Vine |
|---|---|---|---|---|---|---|---|---|---|
| BH-1 | Bangalore | 5.09 | 46.66 | 51.33 | 56.66 | 14.33 | 18.33 | 28.00 | 4.33 |
| BH-2 | Thiruvanamalai | 5.05 | 50.00 | 51.33 | 57.00 | 15.33 | 19.66 | 28.66 | 5.00 |
| BH-3 | Salem | 4.47 | 48.00 | 47.00 | 51.33 | 15.00 | 18.00 | 28.00 | 4.33 |
| BH-4 | Puducherry | 3.87 | 46.00 | 44.00 | 51.00 | 11.66 | 15.33 | 27.33 | 5.66 |
| BH-5 | Cuddalore | 4.97 | 45.00 | 46.00 | 51.33 | 11.0 | 15.00 | 24.33 | 4.33 |
| BH-6 | Panruti | 4.28 | 36.33 | 41.00 | 47.00 | 4.33 | 9.00 | 18.66 | 6.33 |
| BH-7 | Kattumannarkudi | 4.78 | 38.33 | 50.00 | 53.66 | 12.33 | 14.33 | 19.66 | 3.00 |
| BH-8 | Sirkazhi | 4.68 | 39.00 | 44.66 | 49.66 | 10.00 | 13.66 | 23.00 | 5.33 |
| BH-9 | Mayiladuthurai | 5.22 | 40.33 | 46.33 | 53.00 | 10.66 | 15.00 | 26.00 | 3.33 |
| BH-10 | Aduthurai | 4.22 | 37.33 | 47.66 | 54.00 | 3.33 | 8.00 | 16.33 | 7.66 |
| BH-11 | Kumbakonam | 5.14 | 43.00 | 47.00 | 53.00 | 12.33 | 16.00 | 22.66 | 7.66 |
| BH-12 | Thanjaur | 5.21 | 42.66 | 49.33 | 54.00 | 9.66 | 15.00 | 27.33 | 3.66 |
| BH-13 | Thiruvaiyar | 3.69 | 44.66 | 45.33 | 50.66 | 13.33 | 16.00 | 24.66 | 6.00 |
| BH-14 | Chidambaram | 5.32 | 40.00 | 50.33 | 56.00 | 6.33 | 14.33 | 18.66 | 5.33 |
| BH-15 | Thiruvarur | 4.25 | 39.33 | 47.00 | 52.66 | 9.33 | 14.33 | 23.33 | 6.00 |
| BH-16 | Pudukottai | 4.16 | 38.66 | 48.66 | 54.66 | 13.33 | 16.00 | 19.33 | 6.00 |
| BH-17 | CO 1 | 5.00 | 40.33 | 47.33 | 52.66 | 4.66 | 10.33 | 17.66 | 8.33 |
| BH-18 | CO 2 | 4.96 | 43.66 | 44.66 | 50.33 | 4.00 | 9.00 | 16.66 | 10.33 |
| BH-19 | KAU Local | 5.07 | 43.66 | 46.33 | 50.66 | 6.33 | 12.00 | 20.00 | 6.33 |
| BH-20 | Coimbatore | 4.21 | 39.33 | 41.33 | 46.66 | 5.00 | 10.33 | 24.66 | 6.00 |
| BH-21 | Pusa Ujwal | 3.67 | 42.66 | 43.33 | 48.66 | 5.33 | 11.00 | 17.33 | 6.33 |
| BH-22 | Indu | 3.74 | 38.33 | 45.00 | 51.66 | 7.33 | 11.66 | 19.00 | 4.66 |
| BH-23 | IVAG - 90 | 4.07 | 44.00 | 45.00 | 50.33 | 7.66 | 13.00 | 22.33 | 4.33 |
| BH-24 | Kanyakumari | 4.36 | 41.33 | 40.33 | 45.33 | 2.66 | 8.00 | 18.66 | 7.00 |
| BH-25 | Nagapattinam | 3.68 | 38.00 | 46.00 | 52.00 | 13.66 | 15.66 | 18.00 | 4.66 |
| BH-26 | GKVK | 4.09 | 38.66 | 46.33 | 52.00 | 8.33 | 12.33 | 23.66 | 5.33 |
| BH-27 | Culture No.1535907 | 4.48 | 38.33 | 44.00 | 50.00 | 7.33 | 13.33 | 25.66 | 5.00 |
| **SEd** | | **0.49** | **2.38** | **1.62** | **1.51** | **0.67** | **0.99** | **1.55** | **0.83** |
| **CD (0.05)** | | **0.96** | **4.71** | **2.30** | **2.14** | **1.33** | **1.96** | **3.07** | **1.65** |

**Table 2: The Yield Attributing Characters of Selected Ash Gourd Accessories during Experimental Period**

| Genotypes | Sex Ratio | No. of Fruits Per Vine | Single Fruit Weight (kg) | Fruit Length (cm) | Fruit Girth (cm) | Flesh Thickness (cm) | Seed Weight (g) | Seed : Pulp ratio | Yield Per Vine (kg) |
|---|---|---|---|---|---|---|---|---|---|
| BH-1 | 0.78 | 2.66 | 3.25 | 28.93 | 46.13 | 2.43 | 184.66 | 16.60 | 8.14 |
| BH-2 | 0.78 | 3.00 | 2.44 | 26.00 | 40.06 | 2.50 | 143.66 | 16.02 | 6.82 |
| BH-3 | 0.83 | 3.00 | 3.96 | 39.96 | 44.23 | 3.83 | 216.33 | 17.32 | 11.13 |
| BH-4 | 0.76 | 3.00 | 4.51 | 39.66 | 42.40 | 3.10 | 215.00 | 19.98 | 13.06 |
| BH-5 | 0.73 | 3.33 | 3.60 | 36.80 | 45.00 | 3.90 | 209.33 | 16.24 | 11.44 |
| BH-6 | 0.48 | 4.33 | 9.46 | 37.26 | 75.53 | 5.06 | 478.66 | 18.76 | 38.83 |
| BH-7 | 0.86 | 3.33 | 2.97 | 28.30 | 46.62 | 2.20 | 196.00 | 14.08 | 10.93 |
| BH-8 | 0.72 | 2.66 | 3.08 | 29.76 | 36.70 | 2.53 | 214.66 | 13.36 | 7.83 |
| BH-9 | 0.71 | 3.00 | 3.39 | 33.33 | 50.96 | 3.60 | 227.33 | 13.87 | 9.50 |
| BH-10 | 0.41 | 4.00 | 10.48 | 42.36 | 81.43 | 5.70 | 532.66 | 18.67 | 38.33 |
| BH-11 | 0.77 | 3.33 | 4.59 | 38.56 | 62.40 | 4.53 | 242.00 | 17.98 | 12.09 |
| BH-12 | 0.64 | 3.00 | 4.12 | 37.33 | 21.03 | 4.70 | 208.66 | 18.66 | 11.40 |
| BH-13 | 0.84 | 3.33 | 3.81 | 38.16 | 56.00 | 3.76 | 168.66 | 21.55 | 12.33 |
| BH-14 | 0.44 | 3.00 | 4.18 | 34.16 | 53.43 | 3.86 | 190.66 | 20.94 | 12.25 |
| BH-15 | 0.65 | 4.00 | 3.82 | 36.43 | 50.40 | 3.76 | 232.33 | 15.41 | 15.01 |
| BH-16 | 0.83 | 2.33 | 3.00 | 32.63 | 51.63 | 2.90 | 154.66 | 18.41 | 6.76 |
| BH-17 | 0.45 | 2.66 | 6.23 | 35.43 | 62.23 | 5.63 | 278.66 | 21.40 | 15.30 |
| BH-18 | 0.44 | 7.00 | 2.29 | 24.06 | 47.60 | 5.16 | 145.00 | 14.87 | 15.90 |
| BH-19 | 0.53 | 2.33 | 3.48 | 32.53 | 51.67 | 3.66 | 193.33 | 16.95 | 7.73 |
| BH-20 | 0.47 | 3.00 | 4.89 | 32.06 | 61.86 | 4.56 | 253.66 | 18.31 | 13.50 |
| BH-21 | 0.48 | 2.33 | 6.56 | 39.46 | 66.13 | 4.50 | 323.33 | 19.28 | 10.48 |
| BH-22 | 0.63 | 3.00 | 3.65 | 33.13 | 53.83 | 3.10 | 193.33 | 17.83 | 9.60 |
| BH-23 | 0.59 | 3.33 | 4.22 | 35.83 | 59.20 | 3.20 | 211.00 | 19.02 | 13.16 |
| BH-24 | 0.33 | 5.66 | 8.63 | 35.26 | 68.96 | 4.73 | 511.33 | 15.87 | 42.81 |
| BH-25 | 0.87 | 2.66 | 2.81 | 29.96 | 54.86 | 3.16 | 278.00 | 9.13 | 7.36 |
| BH-26 | 0.68 | 3.00 | 3.63 | 34.13 | 55.36 | 3.20 | 176.66 | 19.74 | 6.08 |
| BH-27 | 0.55 | 2.33 | 4.50 | 38.96 | 56.96 | 3.90 | 241.66 | 17.55 | 9.95 |
| **SEd** | **0.03** | **0.47** | **0.42** | **4.47** | **1.63** | **0.77** | **6.02** | **2.66** | **0.90** |
| **CD (0.05)** | **0.48** | **0.67** | **1.18** | **8.86** | **2.31** | **1.53** | **11.92** | **5.26** | **1.79** |

**Table 3: Co-Efficient Variation of Genetic Divergence of Selelcted Ash Gourd Accessories during the Experimental Period**

| S. No | Characters | Coefficient of Variation | | Heritability | Genetic Advance | Genetic Advance as per cent of Mean |
|---|---|---|---|---|---|---|
| | | Phenotypic (%) | Genotypic (%) | | | |
| 1. | Vine length | 16.10 | 9.25 | 33.01 | 49.42 | 10.95 |
| 2. | Days to first male flowering | 7.99 | 5.17 | 41.87 | 31.83 | 68.95 |
| 3. | Days to first female flowering | 7.25 | 4.31 | 46.00 | 34.16 | 66.10 |
| 4. | Node number of first male flower | 43.42 | 42.45 | 95.62 | 77.49 | 85.52 |
| 5. | Node number of first female flower | 24.18 | 22.45 | 86.19 | 57.99 | 42.94 |
| 6. | Number of male flowers per vine | 19.06 | 17.03 | 79.88 | 96.65 | 31.36 |
| 7. | Number of female flowers per vine | 32.12 | 26.54 | 68.26 | 25.48 | 45.16 |
| 8. | Sex ratio | 26.28 | 24.49 | 86.86 | 30.17 | 47.01 |
| 9. | Number of nodes per vine | 10.26 | 7.50 | 53.42 | 47.07 | 11.29 |
| 10. | Number of fruits per vine | 37.48 | 27.72 | 54.70 | 13.86 | 42.23 |
| 11. | Single fruit weight | 47.75 | 44.89 | 88.36 | 39.16 | 86.92 |
| 12. | Fruit girth | 19.56 | 18.87 | 93.04 | 20.60 | 37.49 |
| 13. | Fruit length | 18.45 | 9.37 | 25.77 | 33.76 | 97.97 |
| 14. | Flesh thickness | 32.40 | 20.89 | 41.58 | 10.60 | 27.75 |
| 15. | Seed weight | 42.15 | 42.04 | 99.49 | 21.18 | 86.38 |
| 16. | Seed: pulp ratio | 22.06 | 11.56 | 27.47 | 21.63 | 12.48 |
| 17. | Yield per vine | 70.07 | 69.62 | 98.72 | 19.94 | 14.25 |